

THE FLOOD MONTHS IN THE UNITED STATES.

By ALFRED J. HENRY, Meteorologist in Charge River and Flood Division.

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It is a matter of some interest to inquire into the months and seasons of greatest flood frequency in the rivers of the United States. The records used in the inquiry are found in the system of river gaugings maintained by the U. S. Weather Bureau for the period 1875 to 1918, although a considerable portion of the results is based upon a smaller number of years. The plan followed was to average the high water for each month of the year and to select the month which had the greatest average high water and to consider that month as representing the month of greatest flood frequency. As a rule, the highest water observed at any station for the term of years considered falls within the month of greatest flood frequency, although there are exceptions to this rule. In a few cases the greatest flood of record occurred previous to the beginning of systematic gaugings, but these floods have been generally excluded from the inquiry. The difference between the mean monthly high water and the absolute highest for the period of observations gives a rough measure of the amplitude of the floods at the various stations.

There appears to be a well-defined season of high water which varies slightly for the different parts of the country. These variations will now be discussed.

On the Pacific coast the height of the rainy season falls in midwinter, and naturally floods due to heavy rains in the lowlands and melting snow in the mountains occur in any one of the three months January to March, inclusive.

The annual flood in the two great rivers of the Pacific drainage—the Colorado¹ and the Columbia²—are due to melting snow on the higher elevations of those watersheds. These floods pass into the lower reaches of the streams in June. The winter rains of the Pacific coast States do not greatly affect either the Colorado or the Columbia.

The snow fields of Colorado and Wyoming supply the greater bulk of the water that forms the lower Colorado flood, and although the mouth of the Columbia is about 1,000 miles north of the mouth of the Colorado, the headwaters of both streams are much nearer each other, and snow melting on the higher elevations begins almost simultaneously.

The water of melting snow which passes down the rivers that head on the eastern slope of the Rockies is largely withdrawn for irrigation purposes and the remainder is not sufficient to produce floods. The Rio Grande, for example, is in flood in New Mexico and in the extreme western Texas most frequently in May. Below El Paso, Tex., however, the flood season occurs in September and October, and is due very largely to heavy rains over the watersheds of rivers which enter the trunk stream on its right bank. On the occasion of tropical storms which pass inland from the Gulf of

Mexico (e. g. September, 1919) very heavy rain is precipitated over the basins of the San Juan, the Salado, and the Conchos Rivers of Mexico. The run-off from these streams, owing to the topography and sparseness of vegetal cover, is unusually large. Below Laredo, Tex., the Rio Grande overflows its banks and agricultural interests suffer largely as a result.³

The rainfall between the 100th meridian of west longitude and the eastern foot hills of the Rocky Mountains is not sufficient to produce floods in the streams of that region. Directly to the eastward of that meridian extending from Texas north-northeastward to Illinois there is a well-marked flood season in May and in the middle Missouri Valley in May and June. In the early days floods in the Missouri River in the States of Nebraska, Kansas, and Missouri were ascribed in the popular mind to the melting of snow in the Rocky Mountains. Various Weather Bureau officials stationed along the Missouri have pointed out the fallacy of this idea and the great flood of 1903 and lesser floods in subsequent years due to rainfall over the States of Kansas, Nebraska, Iowa, and Missouri have clearly established the fact that floods in the middle and lower reaches of the Missouri in late spring are due solely to the rainfall of those States.

In the east Gulf drainage the month of greatest flood frequency is March. This is also true of practically the whole area east of the Mississippi. The annual flood in the Mississippi proper above Cairo occurs most frequently in May and June and is the result of heavy rains over northeastern Missouri, eastern Iowa, southwestern Wisconsin, and northwestern Illinois. When the rains occur synchronously with the runoff from melting snow in Minnesota and Wisconsin the intensity of the flood in the middle Mississippi is greatly increased.

The Ohio spring floods occur in March and the output from this river is the main factor in causing floods in the Mississippi below Cairo. The intensity of lower Mississippi floods depends upon several conditions, viz., the initial stage of the river, the magnitude of the Ohio flood, and the volume of water contributed by the western tributaries below the Missouri. Flood water from the Missouri rarely reaches the lower Mississippi until after the Ohio floods have run out. Thus it happens that floods in the Mississippi above St. Louis occur with great frequency in May and June while the month of greatest frequency below St. Louis is April.

In the Atlantic drainage south of New England, March is the month of greatest flood frequency with the single exception of the headwater streams which form the Santee and Great Pee Dee of the Carolinas where average high water of February is greater than March.

In New England floods are more frequent in April than March and there are occasionally severe floods due to heavy rain in the autumn months.

¹ Cf. F. H. Brandenburg, The Colorado River, MONTHLY WEATHER REVIEW, May, 1919, 47: 309-311.

² Cf. E. M. Keyser. Annual rise of the Columbia River, MONTHLY WEATHER REVIEW October, 1917, 45: 500-511.

³ Cf. MONTHLY WEATHER REVIEW, Sept., 1919, 47: 674.